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**METHOD OF APPLYING AN UPDATE TO A CONTAINED COLLECTION OF
PROGRAM AND DATA FILES BASED UPON VERSIONS**

BACKGROUND OF THE INVENTION

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1. Technical Field:

10 The present invention relates generally to the field of computer software and, more particularly, to methods and systems for updating programs and data files based upon versions.

2. Description of Related Art:

15 Software development is the process of creating a software application program, such as, for example, a word processor, web browser, or spreadsheet, to use on a computer. To create these software application programs, software developers (or programmers) utilize software developer's toolkits (toolkits), such as, for example, Java developer's toolkit (JDK), which is available from
20 Sun Microsystems, Inc. Toolkits provide the software developer or programmer with an integrated set of software routines and utilities that aid the programmer in writing and developing software application programs and/or in creating and maintaining databases. For
25 example, for graphical interfaces, a toolkit may provide the tools and libraries for creating menus, dialog boxes, fonts and icons. The toolkit also provides the means to link the application program to libraries of software routines and to link the program with the operating
30 environment, such as Windows™. Windows is a product and trademark of Microsoft Corporation of Redmond,

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Washington.

The current pace of technological innovation and change is faster than ever before. In particular, developments in semiconductor and other computer hardware technologies are creating faster and more powerful data processing systems every day. These developments create new opportunities and capabilities which software developers may utilize to provide better, faster software applications having more features desired by users.

- 10 To keep up with and utilize these technological changes in computing systems and to keep up with or ahead of the competition, software developers are constantly updating and modifying their programs to add more features and to perform faster and more efficiently.
- 15 However, not all data processing systems utilize the same type of computer architecture nor do they all utilize the same operating systems. Thus, many applications have many versions written, each version intended for use on a different type of data processing system. For example, a
- 20 consumer may purchase Quicken® for Windows or Quicken for the Macintosh™, depending on the type of computer the consumer owns. Quicken is a personal financial management software product and a registered trademark of Intuit Inc. of Mountain View, California. Macintosh is a
- 25 trademark of Apple Computer, Inc. of Cupertino, California.

- Currently, when an update or modification is made to an installation toolkit providing support for new features that may be useful for the software application
- 30 programs, each version of the installation toolkit used in the application programs must have its own update

created to update the installer for each application program. This is tedious and time consuming, thus many times, developers do not release an immediate update to their application after a fix or improvement is made waiting instead until many improvements have been made. However, many times users are anxiously awaiting these changes and improvements. Thus, it would be advantageous to have a method, system, and apparatus for the creation of a single update program that may update the many versions of an installer toolkit and work across all supported hardware platforms and/or operating systems. Such single update program should free the developer from having to create a distinct update program for each version of the program and for each hardware platform and operating system on which the program executes, thus encouraging more frequent releases of updates.

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SUMMARY OF THE INVENTION

5 The present invention provides a method, system, and
apparatus for updating code of a software installer
program. In a preferred embodiment a program, such as a
patch, is provided to a plurality of versions of an
install program, wherein the program is updated by an
installation program and a plurality of versions of the
10 installer program exist. Next, it is determined whether
the version of the installer program is incorrect. If
the version is old, the installer program is updated from
files in the patch. The patch is then installed into the
program using the updated installer program.

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The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

15 **Figure 2** depicts a block diagram of a data
processing system in which the present invention may be
implemented;

Figure 4 depicts a flowchart illustrating a method of updating installation files or programs with an updated version of the install toolkit files in accordance with the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and, in particular, with reference to **Figure 1**, a pictorial representation illustrating a data processing system in which the present invention may be implemented is depicted in accordance with a preferred embodiment of the present invention. A personal computer **100** is depicted which includes a system unit **110**, a video display terminal **102**, a keyboard **104**, storage devices **108**, which may include floppy drives and other types of permanent and removable storage media, and a pointing device **106**, such as a mouse. Additional input devices may be included with personal computer **100**, as will be readily apparent to those of ordinary skill in the art.

The personal computer **100** can be implemented using any suitable computer. Although the depicted representation shows a personal computer, other embodiments of the present invention may be implemented in other types of data processing systems, such as mainframes, workstations, network computers, Internet appliances, palm computers, etc.

The system unit **110** comprises memory, a central processing unit, one or more I/O units, and the like. However, in the present invention, the system unit **110** preferably contains a speculative processor, either as the central processing unit (CPU) or as one of multiple CPUs present in the system unit.

With reference now to **Figure 2**, a block diagram of a

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data processing system in which the present invention may be implemented is illustrated. Data processing system 250 is an example of a computer, such as, for example, personal computer 100 in **Figure 1**. Data processing

5 system 250 employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Micro Channel and ISA may be used. Processor 252 and main memory 254 are connected to PCI local bus 256

10 through PCI Bridge 258. PCI Bridge 258 also may include an integrated memory controller and cache memory for processor 252. Additional connections to PCI local bus 256 may be made through direct component interconnection or through add-in boards. In the depicted example, local

15 area network (LAN) adapter 260, SCSI host bus adapter 262, and expansion bus interface 264 are connected to PCI local bus 256 by direct component connection. In contrast, audio adapter 266, graphics adapter 268, and audio/video adapter (A/V) 269 are connected to PCI local

20 bus 256 by add-in boards inserted into expansion slots. Expansion bus interface 264 provides a connection for a keyboard and mouse adapter 270, modem 272, and additional memory 274. SCSI host bus adapter 262 provides a connection for hard disk drive 276, tape drive 278, and

25 CD-ROM 280 in the depicted example. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor 252 and is used to coordinate and provide control of various

30 components within data processing system 250 in **Figure 2**.

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The operating system may be a commercially available operating system such as JavaOS For Business™ or OS/2™, which are trademarks of an products available from International Business Machines Corporation of Armonk, New York. JavaOS is loaded from a server on a network to a network client and supports Java programs and applets. A couple of characteristics of JavaOS that are favorable for performing traces with stack unwinds, as described below, are that JavaOS does not support paging or virtual memory. An object-oriented programming system, such as Java, may run in conjunction with the operating system and may provide calls to the operating system from Java programs or applications executing on data processing system 250. Instructions for the operating system, the object-oriented operating system, and applications or programs are located on storage devices, such as hard disk drive 276 and may be loaded into main memory 254 for execution by processor 252. Hard disk drives are often absent and memory is constrained when data processing system 250 is used as a network client.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 2** may vary depending on the implementation. For example, other peripheral devices, such as optical disk drives and the like may be used in addition to or in place of the hardware depicted in **Figure 2**. The depicted example is not meant to imply architectural limitations with respect to the present invention. For example, the processes of the present invention may be applied to a multiprocessor data processing system.

With reference now to **Figure 3**, a block diagram of

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components used for updating an installation file is depicted in accordance with the present invention.

Typically, when a software developer writes an application program, such as, for example, a word

5 processor, a web browser, or a computer video game, the software developer zips or compresses the data files into a single smaller data file for delivery to a consumer.

Many times the uncompressed files may not be contained on a single computer readable media, such as, for example, a
10 floppy disk or a CD-ROM. However, the compressed file is often small enough to be contained on a single computer readable media for delivery to the consumer, thus costing both the manufacturer and the consumer less.

Furthermore, if the application program is delivered to
15 the consumer via a network such as the Internet, the smaller zipped data file takes less time to download than the uncompressed version of the application program.

For an application program to be installed correctly on a particular platform, an installation program must be
20 included. Typically, software developers do not develop their own installer, but use a previously developed install toolkit, such as, for example, a Java install toolkit. The software developer places the files associated with the install toolkit, which may number in
25 the hundreds, along with the files for the application program itself into one directory 302. This directory may contain a number of installation files, such as, for example, jfile.class, installer.class, uninstall.class, data.zip, and program.class, as well as application
30 program files, such as, for example, application program file 1 and application program file 2 depicted in **Figure**

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3. Once the install and application files are in the directory **302**, the files are zipped (step **M1**) i.e. compressed into a single self-extracting install file **304** often named "install.class".

5 When a new version of the install toolkit is made available, the update patch program **310**, called "fix.class", is downloaded or otherwise loaded onto a user's computer. A patch or patch program is a temporary or quick fix program. Patches are used to update
10 programs without replacing the entire program. Portions of machine code or object code may be replaced instead of decompiling the entire program. A patch also may replace an entire executable module or other files in an application. This new version of the install toolkit
15 may, for example, add or improve support for a particular operating system. When the user desires to update an installer, such as install file **304**, update patch program **310** may be executed as a command line utility with the following arguments:

20 java fix [install.class] -norun

Executing the patch program extracts (step **M2**) the files from install file **304** into directory **302**. The patch program then compares (step **M3**) the sets of files in directory **302** with the version of update patch program
25 **310** to determine whether current install file **304** has a more recent version of the installation toolkit or whether update patch program **310** contains the more recent version of the install toolkit. In one embodiment, the version of each installer toolkit may be obtained from
30 the file program.class. In such embodiment, the file program.class contains information that indicates the

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version number of all files of the installation toolkit within for install file **304**. For example, in Java code, one line of the code in the file program.class may contain the following string:

5 String version = "x"

In this string, "version" is a variable name that indicates that the version of the files contained within install file **304** are version "x", where "x" could be any string of characters. Thus, in the example depicted in
10 **Figure 3**, the string within program.class for install file **304** appears as follows:

 String version = "V1.4"

The placement of this string line within the file program.class is not important.

15 Of course, the file containing the version number of the install toolkit utilized by install file **304** may be given any name desired by the installation toolkit developer. An alternative method of comparing the versions of the two installation toolkits may allow for
20 the version of each file to be obtained and compared with the version of the fix file within fix.class **310** and each file updated independently of the other files.

 If install file **304** contains the more recent version, the files are deleted from directory **302** and no
25 further action is be taken. If, instead, install file **304** does not contain the more recent version of the install toolkit files, as illustrated in **Figure 3** where the install file **304** is version V1.4 and the patch file contains install toolkit version V1.5, then the patch
30 file extracts (step **M4**) the install toolkit files from

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fix.class into directory **302** overwriting the install toolkit files within directory **302** with the new versions of the files to update (step **M5**) the install file **304**. The updated files within directory **302** are then combined
5 or compressed **330** up into a new install file **308** overwriting the previous install file **304**. The files within directory **302** are then deleted to clean up the directory structure of the computer, freeing up disk space and returning the computer to its original
10 condition except for having an updated installer.class **308**.

In a preferred embodiment, update patch program **310** may update any number of versions of install files **304** regardless of the version number of the installer or
15 which platform install file **304** is intended. The same fix.class **310** may upgrade two different installers without the use of an intermediary patch. Thus, the same update patch program **310** may update version V1.1 to version V1.5, as well as update installer version V1.3 to
20 V1.5. Furthermore, there is no requirement that one fix.class file be used to update the installer to an intermediate version, such as, for example, from V1.1 to V1.4, and then a second fix.class file be used to update the intermediate version of the installer to the final
25 version, such as, for example, from V1.4 to V1.5.

The "-norun" flag of the command line argument discussed above disables running the install file **308** after the update has been completed. Alternatively, the "-norun" flag may be replaced by a "-run" flag to enable
30 running the install file **308** after the update has been

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completed.

The [install.class ...] flag of the command line argument discussed above may include the directory file path and name of multiple installer files. Thus, the
5 patch file **310** may update many different installation files within the computer.

Other methods of executing the patch file **310**, other than utilizing the above-given example of a command line, may be utilized as well.

10 Although described primarily with reference to a java installation toolkit, the present invention is applicable to other programming languages as well, such as, for example, C and C++. Furthermore, although described primarily with reference to updating the
15 installation toolkit portion of an installer, the present invention may also be implemented to update the application program files, as well as the installation files within the installer. In such case, the update program would contain not only the updated installation
20 toolkit files, but also the updated application program code and data files as well. The present invention also may be used to update any collection of files to reflect an updated version.

It should also be noted that although described
25 primarily with reference to updating an installer to a newer version of the installer, the present invention may also be applied to update an installer or other collection of files to a correct version, rather than a more recent or newer version. The correct version may be
30 an older version of the installer files than the version of the installer to be updated. For example, an

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installer may contain a newer version of the installer files than the update patch, but nevertheless fail to perform correctly. Thus, the update patch, in such example, overwrites its older, but correct files, into
5 the installer, such that the installer has a correct set of installer files.

With reference now to **Figure 4**, a flowchart illustrating an exemplary method of updating installation files with an updated version of the install toolkit
10 files is depicted in accordance with the present invention. Once the patch file, such as, for example, update patch program **310** in **Figure 3**, containing the updated files is received by the user, the user executes the patch file. To begin, the target installer, such as,
15 for example, install file **304** in **Figure 3**, that needs to be updated is de-compressed to extract the installation files and these files are placed into an empty directory (step **402**). The patch file then determines whether the patch version of the target installer version contains
20 the more recent version of the installer toolkit (step **404**). The patch file may perform this comparison by looking at a single file, such as, for example, program.class, as discussed above.

If the target installer contains the same or more
25 recent version, then the patch file leaves the extracted files unmodified and determines whether a user has requested to run the installer (step **410**). On the other hand, if the patch version contains the more recent version of the installation toolkit, then the newer files
30 are extracted from the patch file and placed into the directory containing the old installer files overwriting

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the older installer files (step 406). The updated collection of installer files, including application program files, are then repackaged as a self-extracting installer (step 408).

5 Next, the patch program determines whether the user has requested to run the target installer (step 410). If yes, then the self-extracting installer is run. The self-extracting installer specifies where files for the application program are to be placed and what parameters
10 are to be called.

After running the self-extracting installer, or if the user has not requested to run the self-extracting installer, the patch program determines whether there are more installers to update (step 414). If there are not
15 more installers to update, then the installer files are deleted out of the directory into which they had been extracted and the process stops. If there are more installers to update, the directory is still cleaned up by deleting all the installer files (step 416) and the
20 process begins with the new installer at step 402.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of
25 the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms, and that the present invention applies equally regardless of the particular type of signal-bearing media actually used to carry out the
30 distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a

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hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and
transmission-type media, such as digital and analog
communications links, wired or wireless communications
links using transmission forms, such as, for example,
5 radio frequency and light wave transmissions. The
computer readable media may take the form of coded
formats that are decoded for actual use in a particular
data processing system.

The description of the present invention has been
10 presented for purposes of illustration and description,
and is not intended to be exhaustive or limited to the
invention in the form disclosed. Many modifications and
variations will be apparent to those of ordinary skill in
the art. The embodiment was chosen and described in
15 order to best explain the principles of the invention,
the practical application, and to enable others of
ordinary skill in the art to understand the invention for
various embodiments with various modifications as are
suited to the particular use contemplated.

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